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Visual Impact Assessment of the Energetic Materials Complex Construction Project on Manhattan Project–Era Historic Properties, the TA-06-0037 Concrete Bowl, and the TA-22-0001 Quonset Hut

Los Alamos National Laboratory

Historic Building Report No. 397

Survey No. 1172

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New Mexico Historic Preservation Division

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**Prepared on
behalf of:** U.S. Department of Energy
National Nuclear Security Administration
Los Alamos Field Office



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1 INTRODUCTION

Concern for potential visual effects to historic Manhattan Project–era properties emerged early in the planning and consultation phase for the upcoming Energetic Materials Complex (EMC) construction project. In initial discussions with project managers and design team members, resource managers became aware of the need to consider potential impacts to the viewsheds of two nearby properties that are eligible for inclusion in the Manhattan Project National Historical Park (MAPR). Resource managers recognized that viewshed characteristics important to the integrity of the Concrete Bowl (Technical Area [TA-]06-0037) and the Quonset Hut (TA-22-0001) conceivably faced the prospect of lasting and irreversible visual impacts.

A strategy to gather necessary data soon emerged. The approach presented to the New Mexico State Historic Preservation Officer (SHPO) on April 7, 2021, combined gathering baseline information from field visits with a geographic information system (GIS)-supported viewshed analysis. Accordingly, results from the viewshed analysis would help resource managers determine if a more comprehensive visual impact assessment (VIA) would be needed. If necessitated by the outcome of the GIS viewshed analysis, initial consultation with the SHPO specified the production of a VIA that would explore any potential visual adverse impacts to the Concrete Bowl and the Quonset Hut.

Cultural resources and GIS specialists with the Laboratory performed a viewshed analysis shortly after consultation with the SHPO. The analysis indicated a high likelihood that at least one of the two Manhattan Project–era properties would experience at least a minimal level of visual impact and that a VIA would be needed. The resulting analysis provides a description of the undertaking, an account of the properties affected along with an evaluation of historical significance, an examination of potential visual impacts, and a determination of effect to the identified historic properties.

2 DESCRIPTION OF THE UNDERTAKING

Planning for the EMC construction is still in the early stages. At the 50-percent planning phase, we have tentatively defined the footprint and produced renderings. Although many aspects of construction are in development, characteristics of impacts on viewsheds are the most important considerations for a VIA. Location, size, and design of the EMC can have a significant impact on the viewsheds of nearby Manhattan Project-era historic properties.

Preliminary design descriptions for the EMC (Burns McDonnell 2021) indicate a site layout that includes three main buildings (laboratory, administration, and storage), magazines, parking areas, pedestrian sidewalks, and security fencing. We project the three main buildings and service magazines to be approximately 100,000 square feet, with a maximum height of two stories in some places. The design recommends specified arrangements of concrete and metal panel cladding for exterior surfaces, strategically placed for blast protection. Bulk and exterior aesthetics pose the greatest potential for visual impacts to nearby historic properties.

Siting of the EMC is slated to take place near two Manhattan Project–era properties. The Concrete Bowl is approximately one-quarter mile to the east, and the Quonset Hut is approximately one-eighth mile to the south. Stands of large ponderosa pine trees exist between each of the MAPR-eligible properties and the proposed construction location, which will help to shield potential visual impacts; however, the immediate construction footprint will undergo a near clear-cutting of trees and a moderate amount of regrading to level the area. Resource managers do not expect interim construction activities to

dramatically affect the lasting viewsheds of either the Concrete Bowl or the Quonset Hut. Any impact from construction activities, such as cranes or increased traffic, would demand only a temporary intrusion to the viewshed. The long-term and primary concern for viewshed integrity relies on the final design and siting of the EMC in relation to nearby Manhattan Project-era properties.

3 IDENTIFICATION OF POTENTIALLY AFFECTED MANHATTAN PROJECT-ERA HISTORIC PROPERTIES

Two properties identified as potentially affected by the new EMC construction include TA-06-0037, commonly referred to as the “Concrete Bowl,” and TA-22-0001, also known as the “Quonset Hut.” Federal legislation and the park’s foundation document deem both properties eligible for inclusion in the MAPR (Federal Legislation 2014; National Park Service [NPS] 2017). Although neither site is formally incorporated within the MAPR boundary, the Concrete Bowl and the Quonset Hut hold considerable historical significance and are each eligible for inclusion in the National Register of Historic Places (National Register) based on architectural character and individual associations with the dawn of the Atomic Age.

Due to National Register and MAPR eligibility—and by considering that substantial historical significance is placed on Manhattan Project-era properties—this VIA addresses impacts that may affect the integrity of the Concrete Bowl and the Quonset Hut. Although the continued preservation of integrity constitutes the leading consideration for determination of effect, we should consider public visitation (as related to *feeling*, one of the seven aspects of integrity) even though it remains a distant prospect due to security concerns; however, certain Laboratory personnel currently have the opportunity to visit both sites. Visitation—even if only by Laboratory staff—fosters a greater appreciation and a more complete understanding of the importance that both sites played in the development of atomic weaponry. As such, the core intention of this VIA is to identify potentially affected properties and evaluate the potential adverse effects of the project on their integrity and historical significance.

3.1 Concrete Bowl (TA-06-0037)

The Concrete Bowl imposes an undeniable authority on an already sublime landscape dominated by outlying high pines and a rolling, grassy terrain. The impact of a giant, saucer-shaped concrete bowl two hundred feet in diameter—and to a certain degree evocative of science fiction movie sets—manipulates the senses into dreaming of a long-ago, yet faded actuality with an imperceptible and perhaps suspect purpose (Figure 1). In spite of this rather fantastic visualization, records show that the large saucer design was fashioned strategically to direct water to a center point. Its distinctive architecture demonstrates a strict functionality exclusive to atomic device testing.



Figure 1. The Concrete Bowl from above. When used for scale, the mature ponderosa pines are dwarfed by the size of the structure.

Although the architectural significance of this unique structure cannot be overstated, the Concrete Bowl's association with the development of atomic weaponry garners a significance all its own. The Concrete Bowl was constructed in the fall of 1944 to test plutonium-retrieval techniques. Implosion-device testing at Project Y (the code name assigned to Manhattan Project work performed at Los Alamos) demanded tremendous efforts in the conservation of manufactured plutonium. At that time, only small amounts of the prized material had been produced. This limited production led to early concerns that testing would exhaust all available supplies of plutonium ahead of wartime deployment. If a full-scale implosion test failed to go critical from an initial high-explosives (HE) detonation, plutonium would be scattered at a great distance by the HE blast. Recovery of plutonium would be extremely difficult from an unmodified surface such as bare ground.

The concept of the Concrete Bowl allowed bits of plutonium to be captured on the smooth concrete surface, then rinsed downslope toward the center. Test explosions took place on top of a tower above the center of the bowl. On the tower, Project Y scientists used a water-filled basin to help contain the explosive force of the blast (Figure 2). Although the capture and recovery concept embodied by the Concrete Bowl effectively retrieved substitute metals in practice, the relatively small-scale tests conducted by Project Y scientists indicated that the concept would not be cost effective or of practical size for the full-scale test planned at the Trinity Site.



A recovery device such as the Concrete Bowl was never used for a full-scale test, but other techniques to capture plutonium were under concurrent development, and a containment system design was ultimately selected. “Jumbo,” a massive containment system conjured up by Project Y scientists, still sits at Trinity Site today. As preparations for the Trinity test moved forward, Project Y scientists were confident that the full-scale test would succeed and that enough spare plutonium had been manufactured to proceed with the July 16, 1945, test of “The Gadget” independent of any form of recovery device.

In its present state, the Concrete Bowl sits alone approximately one-quarter mile east of the EMC project area. A slight elevation gain exists from the Concrete Bowl to the project area, and a small drainage coursing roughly north-south bisects the topography halfway between the two areas. Large ponderosa pine trees are scattered between both sites and are noticeably more concentrated around the drainage, affording an effective visual screen. The tall stand of trees, combined with the sloping terrain, make for an effective visual screen west to the EMC project area from the Concrete Bowl.

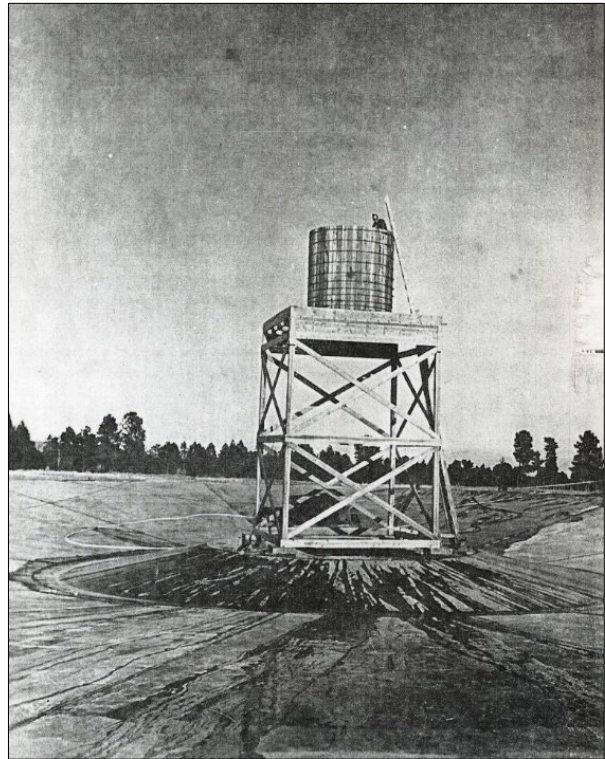


Figure 2. The center of the Concrete Bowl contained a raised basin. Explosions were set off, and materials collected at the center after being rinsed downslope.

3.2 Quonset Hut (TA-22-0001)

The Quonset Hut at TA-22 (Figure 3) is the last remaining Manhattan Project-era Quonset hut from Project Y in the Los Alamos area. Fortunately, the Quonset Hut narrowly avoided demolition because a few individuals recognized its historical importance. Early in 1945, Project Y personnel quickly planned and constructed two Quonset huts on Two Mile Mesa in response to the dire need for additional space at V-Site. Personnel there were tasked with completing HE assemblies for implosion-type devices. With the successful development and imminent testing of such devices, assembly space was at a premium in the final months of 1944. The buildings at V-Site could not meet the personnel and space requirements to assemble two separate devices for a full-scale implosion test and a usable weapon for wartime deployment after a successful test. Planners at the Laboratory recognized the expediency required for the acquisition and erection of a fully enclosed building dedicated to HE component assembly. Fortunately for Laboratory planners, such a building was a common sight wherever United States military operations were found. Quonset huts were perhaps the preeminent building for the United States military during World War II (WWII). Due to design, materials, and process, the building type could be manufactured quickly. It was fast to assemble—especially for crews specifically trained to do so—and functionally, the building type was wide-ranging and versatile. If these qualities were not enough, then the fact that some of the same personnel who were working to fine-tune the assembly process before deployment in the Pacific were going to be the same people assembling the weapon in a similar building on Tinian Island before loading it onto a B-29.



Figure 3. Historical photograph (circa 1946) showing the west and south elevations of the TA-22 Quonset Hut.

The Quonset Hut at TA-22 represents a typical “warehouse” model that measured a standard 40 by 100 feet. Quonset huts were designed with strength and efficiency foremost in mind. A fastening system that presented construction crews with nailing grooves to affix metal to metal allowed for the strength of metal construction with the ease of construction techniques used in traditional wood framing.

The Quonset Hut sits approximately one-eighth mile from the EMC project area on terrain and vegetation cover similar to that which is between the construction zone and the Concrete Bowl.

4 SIGNIFICANCE OF POTENTIALLY AFFECTED MANHATTAN PROJECT-ERA HISTORIC PROPERTIES

The visual qualities that contribute to the integrity of the Concrete Bowl and the Quonset Hut are potentially affected by the construction of the EMC. An impact to integrity can adversely affect the historical significance of these properties. This section provides an overview of the qualities that contribute to the historical significance of the Concrete Bowl and the Quonset Hut. Furthermore, these qualities led to the properties’ eligibility for listing in the National Register. Any negative impact to the properties’ eligibility is considered an adverse effect; however, before an effect to a property can be determined, we must thoroughly understand and discuss the qualities that contribute to National Register eligibility.

The following discussion addresses the period during which the Concrete Bowl and the Quonset Hut have significance. Revealing the period of significance supports the identification of character-defining features distinctive to the period. A close examination of retained integrity steers the discussion to National Register eligibility and what characteristics—especially regarding viewshed—are important to preserve.

4.1 Concrete Bowl (TA-06-0037)

The historical significance of the Concrete Bowl rests firmly within the period related to Project Y and the effort to develop atomic weaponry toward the end to WWII. In addition to the period of significance, the Concrete Bowl exhibits an architectural uniqueness and quality that makes it eligible for inclusion in the National Register. The preservation of character-defining features and integrity at the Concrete Bowl is strong and leads to inclusion under Criteria A and C.

4.1.1 *Period of Significance*

The Concrete Bowl's significance lies with Project Y's attempts to capture as much plutonium as possible from implosion-device testing. This period in the development of an atomic device came relatively early in Project Y's history when scientists were not exactly sure how much plutonium they would have for the final design and exactly how best to capture material immediately after a test. During this important time in the Manhattan Project era, Project Y personnel demonstrated their affinity for pursuing multiple tracks to a same end (McGehee et al. 2004).

Scientists were developing the water-recovery technique while investigating other techniques, which included a sand-capture technique and a containment technique. Although the water-recovery method was ultimately determined to be too costly and time-prohibitive for the Trinity test, the Concrete Bowl signifies the extreme measures that scientists not only conceptualized to develop atomic weaponry but also created; those efforts still stand present to tell that story.

4.1.2 *Character-Defining Features*

Character-defining features of the Concrete Bowl directly relate to its function. Its association with plutonium capture can be recognized fully in its form, materials, and setting. The round, saucer-like shape and inward slope of the Concrete Bowl illustrate its function to capture materials and transport them to its center. Its size of 200 feet in diameter speaks to its intended function of recovering material spread out by an explosion.

The function required a readily available non-absorbent material suitable for moisture drainage. Concrete fit the bill because it could be smoothed out and easily shaped. Concrete is relatively hydrophobic—especially in the short term—and has the ability to shed water to a desired destination. Other readily available, easily formed materials such as asphalt would not have sufficiently served to transport recovered material like concrete.

The Concrete Bowl was set in a highly secure area because of the type of testing that was to take place. The Concrete Bowl had two associated buildings. Other buildings were sited nearby during the Manhattan Project era; however, these buildings were set safely away at a distance because of the explosives testing at the Concrete Bowl. The setting during Project Y retained a good amount of open space between the Concrete Bowl and other non-associated buildings.

4.1.3 Integrity

The integrity of the Concrete Bowl survives largely due to its short duration of use, very specific functionality, and awe-inspiring visual impact. Explosives testing at the Concrete Bowl lasted for about a year, and afterward, the only suitable use for such a specifically constructed structure was the performance of shake tests performed on HE. Although the Concrete Bowl was used for a short time after its initial construction, the sheer size and expression of the structure demanded attention and realization of importance. Consequently, the Concrete Bowl survives today and has escaped demolition, unlike many other visually indistinctive buildings and structures from Project Y.

The integrity that endures with the Concrete Bowl captures many of the seven aspects used to evaluate the significance of historical buildings (NPS 1995). Although such aspects as design and materials are important to the significance of the Concrete Bowl, consideration of visual impacts to integrity is more important for categories such as location, setting, feeling, and association. In the following paragraphs, we have presented each of the seven aspects of integrity regarding the Concrete Bowl. Although we have evaluated all facets of integrity, we place greater focus on visual characteristics that distant EMC construction activities could affect and not direct effects to the structure.

Location

The Concrete Bowl remains in the same location where it was originally constructed. This aspect stems from the extent of size and construction technique; moving the entire concrete structure to a different location represents an impossible and pointless task. The fixed location in which the Concrete Bowl was constructed is where extensive preliminary assessments and experimentation occurred in preparation for capturing plutonium at the Trinity test site. Although this capture technique failed to emerge as the leading method of recovery due to size and cost, the Concrete Bowl's location, as part of the sustained integrity of the setting, underscores the trials and tribulations that led to the historic detonation of the first atomic device.

Setting

Setting is an important consideration of integrity that weighs characteristics beyond location. Surrounding natural and cultural landscapes offer important dynamics that reveal historical significance of the property. The setting central to the Concrete Bowl is one of high security, industrial development, and natural obstructions. The mesa and resulting canyon walls on which the Concrete Bowl sits—combined with security fences and checkpoints—present an undeniable sense of fortification and secrecy. This setting today is much the same as it was during Project Y. Open grasslands interspersed with tall ponderosa pine stands dominate the natural landscape, whereas the built environment consists of buildings dedicated to research, engineering, and manufacturing. Historical aerial photography shows a lesser number of trees in between the Concrete Bowl and the proposed EMC construction site, and buildings were scattered throughout the landscape much like today. Based on historical documentation and an on-the-ground survey of the area, the current setting has changed little from the Concrete Bowl's period of significance and retains a high degree of integrity.

Design

The design of a building or structure often compliments its surroundings; however, in the case of the Concrete Bowl, the design was based solely on function rather than aesthetic relationship to the setting and is more profound due to conceptual development and the engineering pursuits enabled by the form of the structure. The design permitted specialized testing in preparation for the first full-scale atomic detonation. Other than the loss of the wooden elements (Figure 2), the overall form and design intent of

the Concrete Bowl remain intact. Design integrity is high and still promotes the historical significance of this important structure.

Materials

Retention of materials remains moderately high. Although the original wooden elements have mostly deteriorated away or were never rebuilt after the final explosion (e.g., the center tower), the integrity of the remaining materials supports the historical significance of the Concrete Bowl. The concrete material used to construct and form the structure remains largely intact. The use of this material is important to the function of the Concrete Bowl in that the use of concrete was critical to the performance of the structure. Concrete allowed for a smooth, hydrophobic surface in which sprayed water could easily transport recoverable metals to the center of the structure for collection. The use of concrete is integral to the story that the Concrete Bowl plays in the evolution of plutonium capture and collection. Developing historical and archaeological research at the EMC construction site indicates that earlier iterations used asphalt for the collection surface. The selection of concrete over asphalt makes sense when considering the ability to apply a smooth surface for smaller-scale recovery efforts.

Workmanship

Workmanship regarding the Concrete Bowl shows the expediency of the time and the “spare no expense” mentality of the effort to develop an atomic weapon. A closer look at the concrete material shows that the mix was not prescribed to last. Although the size and expenditure of funds for a concrete bowl capture device for a full-scale test was ultimately deemed to be inappropriate, the scale of this Concrete Bowl for testing shows that the Project Y culture of this period was one of “whatever it takes” to get the job done. When interpreted appropriately, the workmanship is present in the remains of the materials.

Feeling

The Concrete Bowl presents a feeling consistent with its historic character. The large-diameter, concrete, saucer-shaped structure harkens the mind to the days of fantastic scientific research. The feeling one gets upon seeing the structure produces awe and curiosity. These feelings prompt educational exploration that results in a better understanding of the processes that led to the harnessing of the atom.

Association

Testing and development of plutonium weapons provide links to the historical importance of the Concrete Bowl. Initial stages of testing and development saw a concerning shortage of plutonium. At the time, plutonium was in short supply and was projected to remain that way. Exhaustive testing of plutonium devices was expected to expend the extremely small supply and all future projected manufactured supplies. Fortunately, production increased significantly by the time that Project Y scientists were ready for a full-scale test. The Concrete Bowl represents one of multiple design attempts at the capture and collection of plutonium. Although it was not adopted as the final means of capture and collection for the full-scale test at the Trinity Site, the Concrete Bowl provides a tangible representation of the limitless means for this pursuit.

4.1.4 *National Register Eligibility*

The Concrete Bowl is eligible for inclusion in the National Register under Criteria A and C (McGehee et al. 2003). Its association with the development and testing of the first implosion device that led to the Fat Man weapon, which brought the world into the Atomic Age, meets Criterion A for inclusion in the National Register. The Concrete Bowl was used for materials retrieval testing in preparation for the

Trinity test. Other testing included shake tests to determine the stability of the HE used for the implosion during transport in general but more specifically for its delivery to a full-scale testing area.

Under Criterion C, the Concrete Bowl presents a one-of-a-kind construction. Its distinct shape and size led to a feeling of awe and curiosity. This uniqueness of design and its association with a historically significant event qualify the Concrete Bowl for eligibility in the National Register.

4.2 Quonset Hut (TA-22-0001)

The Quonset Hut (Figure 4) holds a high level of significance through its retained architectural integrity and association with WWII atomic weapons development. Many character-defining features central to its architectural and historical significance have been preserved and contribute to the integrity of the building. As a result, National Register eligibility through Criteria A and C is achieved.



Figure 4. North and west elevations of the Quonset Hut. The west elevation currently represents the primary entrance, with vehicle parking available a few feet away.

4.2.1 Period of Significance

Project Y planners requisitioned the TA-22 Quonset Hut in 1945 as a response to a need for additional space. HE assembly operations for the two implosion devices, the Gadget and Fat Man, required a greater area than what the buildings at V-Site allowed. Personnel and space at V-Site were already consumed by assembly operations for necessary components of the Gadget, the full-scale test device intended for Trinity Site. With V-Site at capacity, work to assemble the Fat Man components would need to take place elsewhere. The Laboratory designated an area on Two Mile Mesa for this purpose. Two Mile Mesa offered the required space and security during this crucial period of accelerated assembly. Project Y

personnel hurried to assemble both the Gadget and Fat Man in a rush to test and deploy an implosion device that hopefully would put a quick end to WWII.

The Quonset Hut was used for the assembly of an implosion device to hasten an end to the war during one of the most important time periods of the 20th Century. An invasion of the Japanese homeland was imminent, and an incredible loss of life on both sides was projected. Instead, the Fat Man device was detonated over Nagasaki, Japan, on August 9, 1945, effectively forcing Japan to surrender, putting an end to WWII.

Although the Quonset Hut's association with the end of WWII expresses immense historical significance, architectural qualities embodied in the physical remains of the building allude to an important period of construction in the United States. Project Y planners and developers likely selected the Quonset hut design for multiple reasons, including expediency and obtainability. Additionally, Quonset huts were prevalent in the Pacific. The Project Y assembly team working in Los Alamos to build the Fat Man device would also be responsible for its reassembly on Tinian Island before its deployment. The military constructed numerous Quonset huts on Tinian Island, and the TA-22 Quonset Hut would offer an air of familiarity to the Project Y assembly team.

Quonset huts were prolific not only in the Pacific but throughout much of Europe and the continental United States during and immediately after WWII. Due to the abundant numbers of Quonset huts during this period, the architectural features that combine to make a Quonset hut are synonymous to many within the WWII period. The TA-22 Quonset Hut exhibits many of these characteristics, presenting a unique sense of the WWII period that many other building types cannot.

4.2.2 Character-Defining Features

The TA-22 Quonset Hut exhibits character-defining features consistent with its significance to WWII history and the requirements of Project Y. The designed expediency of construction of a typical Quonset hut lends definition to both the general requirements of WWII settings and the Project Y mission. Just before WWII, the United States military sought out a building that would serve multiple functions while being fast and easy to erect (Decker and Chiei 2005). Drivers of Project Y required a building that was not only quick and easy to erect but one that provided a familiar setting to staff who would likely spend time in a Quonset hut on Tinian Island.

Character-defining features specifically include this building's form (semi-cylindrical profile), materials (corrugated-metal outer shell), design (focused on expediency), and place (secure mesa top). The semi-cylindrical profile of the building is emblematic of a Quonset hut's visual influence. The impression that this unique form imparts is synonymous with many of the images people hold of the United States military's WWII presence throughout Europe and the Pacific, and this intangible imprint and high frequency of use is one of the reasons Project Y selected this style of construction.

The materials and design offered an expedient means of construction in a time when time was of the essence. The corrugated metal used for a Quonset hut's outer shell was rapidly manufactured. Given the construction method of the ribs and fastening technique of the metal sheets to the ribs, the materials offered the United States military not only a stronger-than-wood solution but also a quick assembly process that could be performed by minimally trained personnel (Decker and Chiei 2005). The design and construction of Quonset huts played a large part in what caused the military to adopt the building type. Simplicity and flexibility of design, efficiency of manufacture and assembly, and the strength of the materials allowed for the Quonset hut's proliferation throughout the battlefields of WW II and made it a more-than-suitable building for Fat Man assembly during Project Y.

Form, materials, and design offer important character-defining features to consider, but perhaps the most important character-defining feature to study regarding visual impacts is setting. The setting of the Quonset Hut during its period of significance is that of security and industrial testing and production. The Quonset Hut was constructed within the perimeter of a highly secure scientific laboratory that was engineering, testing, and producing the components important to the first atomic weaponry. At the time, other buildings visible from the Quonset Hut were functioning in similar roles to achieve the Project Y mission of developing an atomic weapon capable of deployment. Today, many of the buildings that occupy that setting with the Quonset Hut serve to perform similar work, although in ways much more broad that fit the Laboratory's current mission.

4.2.3 *Integrity*

The Quonset Hut retains a significant degree of integrity despite more than 75 years of dynamic Laboratory operations and an occasion when it was nearly demolished. A handful of people with institutional knowledge of the Quonset Hut's historical importance saved the building and thereby protected important character-defining features and the integrity of the building.

Retention of integrity confirms significance and eligibility. The Quonset Hut's historical significance stems from an association with the development of the earliest atomic weaponry and its renowned architectural style. Seven aspects of integrity, presented in the following paragraphs, reveal the extent of significance retained by the Quonset Hut, which then leads to a discussion of the appropriateness for listing in the National Register.

Location

The Quonset Hut is still sited in its original location. In combination with setting, the selected location within a secure and remote area underscores the significance of the building. Project Y planners realized that Two Mile Mesa offered an ideal location for the security and privacy required by the work that was to be done in the Quonset Hut. With the building still in place, much of the surrounding natural environment reminiscent of the Manhattan Project era, and a built environment that is functioning in much the same way, integrity of location remains high.

Setting

Many noteworthy changes have occurred to the setting around the Quonset Hut since Project Y. In particular, the built environment around the Quonset Hut has played witness to the removal of buildings and the addition of other buildings. Although this change may be viewed as a cumulative adverse effect in many other settings, the functions of the new buildings are much the same as that of the old buildings. The style of the buildings has changed, but the purpose has not, and the purpose relies on the setting. In and around Two Mile Mesa, the endeavors of the past and present come together to emphasize the importance of the setting regarding site selection and development.

The environmental/natural setting is still reminiscent of the Manhattan Project era, where forested and grassland mesa tops offered secure areas for the pursuits of Project Y. The view for Manhattan Project staff was filled with tall ponderosa pines and grassy open areas interspersed with industrial style buildings that housed research and development of atomic weaponry. Despite modern additions to the built environment, the setting around the Quonset Hut remains intact with a high degree of integrity and limited cumulative effects.

Design

The design style of the Quonset Hut is important to its eligibility. The exterior form of the Quonset Hut has changed little over time and is important when considering the intentions of the planners. Quonset huts were designed to be quick and easy to erect and to provide multi-functional capabilities, along with strength and security for battleground applications. Although the interior designed space has changed dramatically through the years, we could reverse most of these changes to a point where the original intention of the design can be realized.

Materials

The Quonset Hut retains many of the materials from its period of significance that communicate the importance of its architectural style. These materials largely include the corrugated metal exterior side paneling, steel-ribbed construction, and Masonite interior siding. Steel construction offered strength and durability while showcasing technological achievements such as curved, corrugated metal panels and a steel fastening system that allowed for the massive levels of deployment seen during WWII.

Workmanship

The design and technological advancement that led to the efficient manner of workmanship is still present and can be interpreted through various architectural components present in the design. Efficiencies embodied in the construction of a Quonset hut—although not considered a traditional craft—are indicative of the military culture of the time and the necessities required by the war. Work to erect Quonset huts could be performed by individuals with little skill and training. This level of workmanship offered the United States military precisely what was needed for wartime application.

Feeling

The physical features discussed with the integrity of setting, design, materials, and workmanship lead to a feeling effectively captured in the aesthetic expression of the Quonset Hut. No other building type embodies the feel of WWII like a Quonset hut. In combination with setting, the TA-22 Quonset Hut highlights the secure nature of the work that occurred within the building and the feel of weapons research and development during the war.

Association

The TA-22 Quonset Hut survives as the place where the major components for the Fat Man device that was dropped on Nagasaki, Japan, were assembled before the device's deployment in the Pacific. Many of the features that convey this association are still present. Of particular note, the interior exhibits the original crane rail system that staff used to move heavier components within different functional areas of the building and then to the outside of the building for transport away from the site.

The exterior of the Quonset Hut expresses association with the assembly of Fat Man components through its size and form. Space was at a premium as evidenced by the relocation of Fat Man-specific assembly operations from V-Site to a "warehouse" type Quonset hut on Two Mile Mesa. Assembly operations required adequate workspace that a large Quonset hut could provide. The size of the Quonset Hut appealed to planners, but the adaptable functionality of Quonset huts was also attractive. Features such as existing materials and construction techniques still visible throughout the building show an association with the building requirements essential to assemble the components of the Fat Man device.

4.2.4 National Register Eligibility

The Quonset Hut is eligible for listing in the National Register under Criteria A and C. The building's connection with the development of plutonium implosion weaponry and the use of the Fat Man device over Nagasaki, Japan, on August 9, 1945, achieves eligibility status under Criterion A. The Nagasaki bombing represents an internationally significant event that continues to have global implications in science, technology, and the socio-political landscape of the modern world.

National Register eligibility relies on a meticulous investigation and chronicling of integrity retention. The discussion herein concerning integrity presents a careful examination of the Quonset Hut's current state of preservation. This detailed, yet brief examination of existing conditions provides an appropriate display of the suitability for National Register eligibility under Criterion A. The seven aspects of integrity as discussed illustrate a high level of retention that verifies that the Quonset Hut sustains the criteria for National Register eligibility.

Under Criterion C, the Quonset Hut represents a design and construction manner synonymous with the expediency and critical need of war. Quonset huts achieved a standing of association brought to the forefront by the United States' participation in WWII by means of an adaptable design, straightforward manufacturing process, and ease of assembly that they provided to the United States military during WWII. Design and construction permitted the assembly of Quonset huts in unimaginable numbers throughout much of the WWII landscape. Due to the prolific use of Quonset huts in Europe, the Pacific, and in the United States, the building type is perhaps the most easily identifiable and recognizable from any point in modern history.

5 VIEWSHED ANALYSIS

Site visits by members of the Historic Buildings team initially suggested that the EMC construction would not visually affect the Concrete Bowl. The team reached this conclusion based primarily on the presence of a stand of ponderosa pine trees between the Concrete Bowl and the proposed construction site. Conversely, site visits indicated that visual impacts to the Quonset Hut would likely occur despite a separate stand of ponderosa pines between the proposed construction area and the Quonset Hut. Although site visits provide important and pertinent information of a subjective and qualitative manner, the Historic Buildings team determined that a GIS viewshed analysis should take place to provide objective and quantitative data.

The GIS-generated viewshed analysis presented in this report illustrates visual impacts through two different data sets. The first set of data presents detectable viewscape intrusions from points at both the Concrete Bowl (Figure 5) and the Quonset Hut (Figure 6). These data weigh the effects of terrain and vegetation height on the viewshed. The second set of data shows both views from each property but displays only viewshed data in reference to terrain and not vegetation (Figure 7). The data set that accounts for terrain and vegetation is the most critical of the two data sets for current on-the-ground conditions and holds immediate importance over the second data set. However, the second data set is important because it reveals aspects of plausible settings where vegetation no longer provides a degree of visual shielding. Altered landscape conditions in the future may result from mass or localized die-off situations following pest infestations, worsening drought conditions, or increases in atmospheric temperature. Consumption of surrounding vegetation due to fire or mechanical clearing for construction projects may also change current conditions in the future. Historical precedent indicates that all of these scenarios are possible and should be identified now for consideration of possible effects in the future.

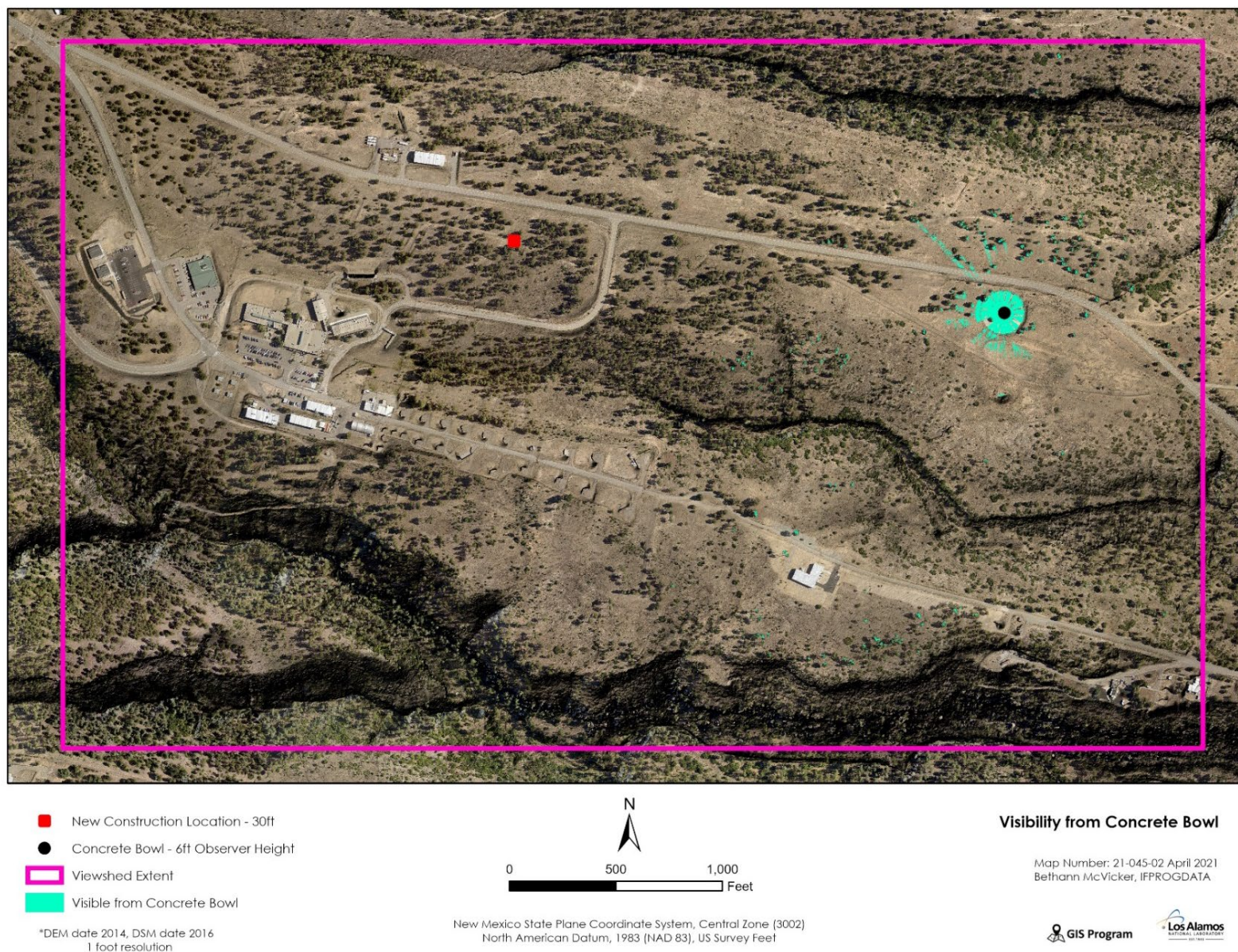


Figure 5. Viewshed analysis results showing visible areas from the Concrete Bowl based on topography and vegetation growth.

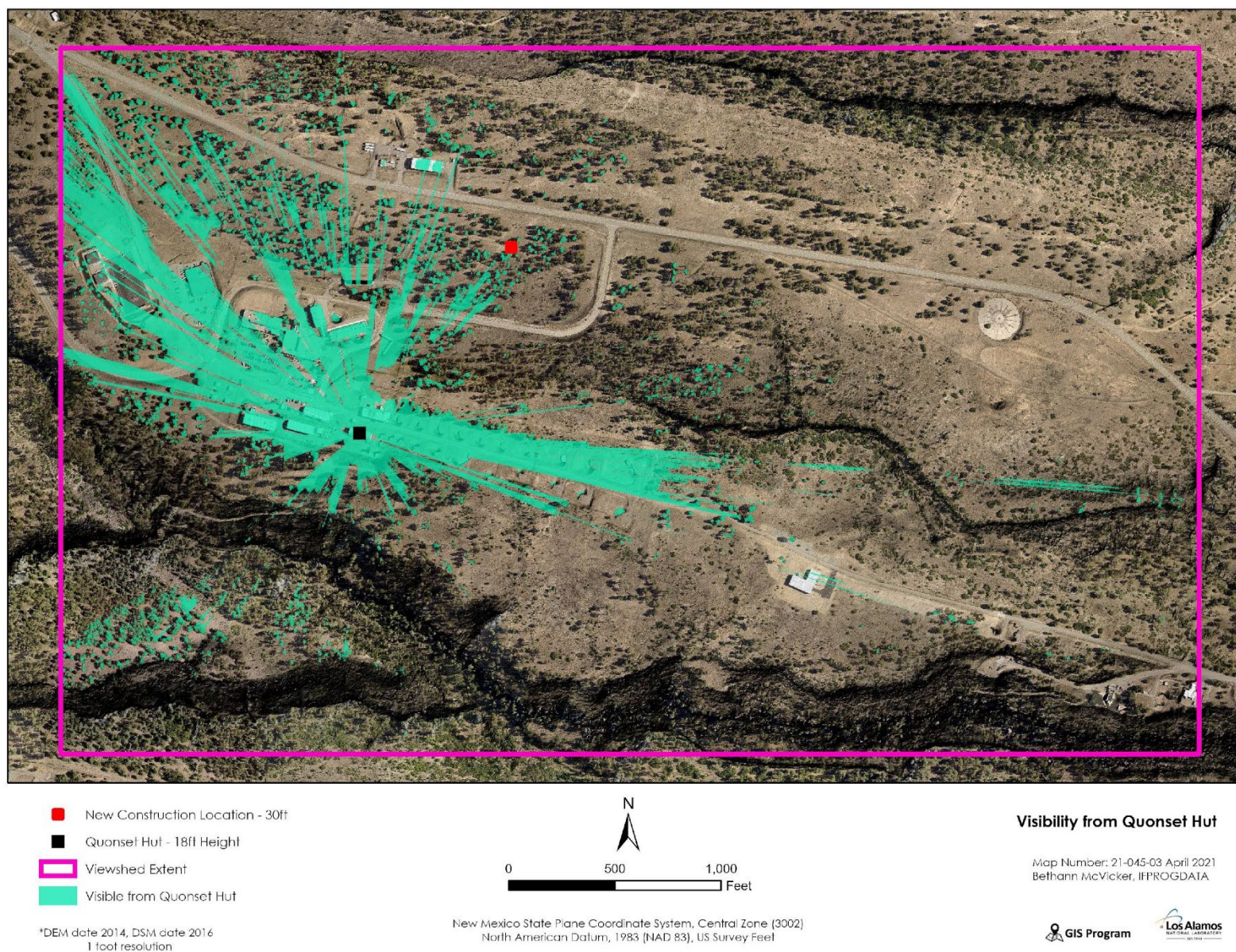


Figure 6. Viewshed analysis results showing visible areas from the Quonset Hut based on topography and vegetation growth.

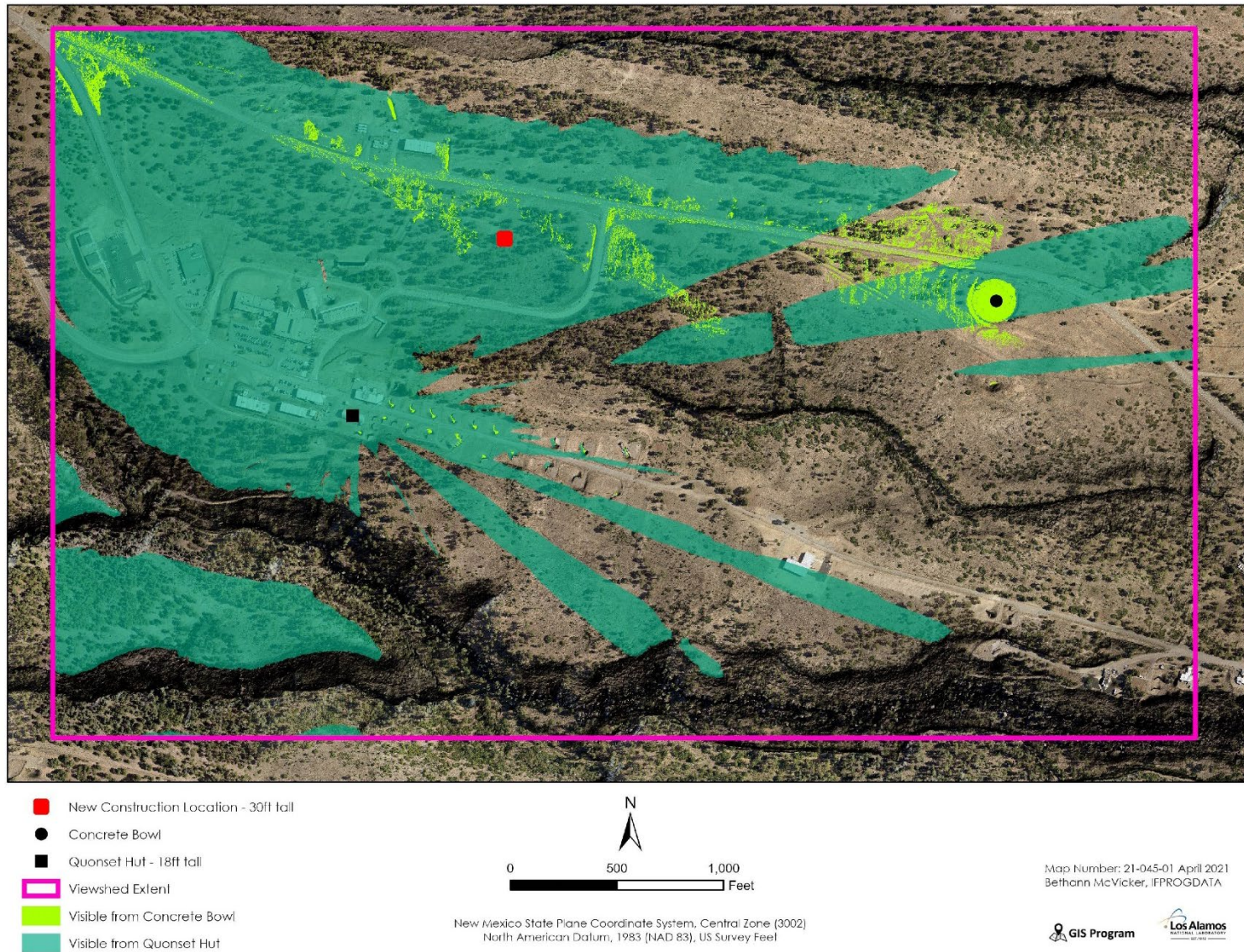


Figure 7. Viewshed analysis results showing visible areas from both the Concrete Bowl and the Quonset Hut. Vegetation is not taken into consideration; only topography. The EMC's location, represented by the red dot, is positioned in the middle of the proposed project area. Both light and dark green visible indicators are present within the footprint of the EMC.

However, present-day conditions represent the primary concern for this report. Figure 8 shows that, with a combination of terrain and vegetation, the Concrete Bowl will not experience any visual effect from the construction of the EMC. This analysis is consistent with site visit assessments that took place before and after the results of the viewshed analyses were available.



Figure 8. The Concrete Bowl is shown in the foreground of this photo that was taken facing the direction in which the EMC complex will be constructed. The stand of ponderosa pines on the other side of the structure presents an effective visual shield according to the viewshed analysis and on-the-ground investigations.

Figures 9 and Figure 10 illustrate the viewshed data obtained for the Quonset Hut and indicate that the EMC project area will be visible from the Quonset Hut, even though stands of ponderosa pine are present between the two. A site visit confirms this decision and validates that the EMC will be most visible from the east and west elevations of the Quonset Hut. These elevations are important points of entry and egress for visitors to the building. People who enter and exit the building at either end will have a high likelihood of seeing the EMC.



Figure 9. This photograph shows the west entrance of the Quonset Hut facing in the direction of the proposed EMC construction.



Figure 10. This photograph shows the southeast corner of the Quonset Hut facing the direction where the EMC will be most visible through the pine tree stand.

6 VISUAL CONTRAST ANALYSIS AND SIMULATIONS

The EMC as presented in the conceptual renderings (Figure 11 and Figure 12) will dominate the immediate viewscape; however, the GIS viewshed analysis indicates that the complex is unlikely to be visible from the Concrete Bowl due to current vegetation cover. Alternatively, the Quonset Hut will be visually affected by the complex. Based on the viewshed analysis, conceptual simulations, and dimensions obtained from the Conceptual Design Report (Burns McDonnell 2021), the EMC will have a direct visual impact on the Quonset Hut. Although the simulations and viewshed analysis indicate an effect, an examination of the contrast will help determine the level of the effect to the Quonset Hut.



Figure 11. Conceptual 3D rendering of the EMC's south elevation (Burns McDonnell 2021).



Figure 12. Conceptual 3D rendering of the EMC's north elevation (Burns McDonnell 2021).

Visual contrast offers a means to calculate change to the viewshed from an undertaking (Sullivan and Meyer 2014). The Bureau of Land Management (BLM) developed a rating system that provides a more perceptible definition of this change (BLM 1986). The Visual Contrast Rating (VCR) system specifies ratings of “No Contrast” to “Strong Contrast.” In the middle are “Weak Contrast” and “Moderate Contrast” ratings. Using the BLM VCR system to help achieve an accurate rating, we developed a series of factors that includes distance, angle of observation, relative size or scale, and spatial relationships.

With the above factors in mind, we conducted a site visit to the Quonset Hut. An assessment of the factors involved the identification of key observation points (KOPs). As noted in the previous section, KOPs for the Quonset Hut were identified primarily from the two entrances on each end of the building (west and southeast elevations, Figure 9 and Figure 10). Although windows run the length of the north elevation, a nearby building effectively blocks any long-distance views from the interior of the building. The Quonset Hut KOPs facilitated appropriate data collection to assign a corresponding visual contrast rating.

This short distance upheld the results of the GIS viewshed analysis, and views from both KOPs supported a determination of a strong contrast rating based on angle of observation and distance. At a projected area of approximately 100,000 square feet, the scale of the building complex also warrants a contrast rating of strong; however, the final factor that we must consider is paramount, and we consider it an overriding factor in determining an overall VCR. The *spatial relationships* factor looks at an undertaking’s relationship within a landscape. As discussed in the previous section on the aspects of integrity, setting plays an enormous role in the historical significance of the Quonset Hut. A modern-built environment is highly regarded as a contributing factor to cumulative impacts on historic properties in many cases; however, the modern-built environment here actually plays a vital role in preserving historical significance and emphasizing the importance of the Quonset Hut to the history of atomic weapons research and development.

Although decidedly impactful from the Quonset Hut’s KOPs in distance, angle of observation, and scale, the EMC does not have a detrimental impact regarding spatial relationships. The project will create very little contrast of setting in its relationship to this Manhattan Project–era building. As such, an overall VCR of *weak* is appropriate for the visual contrast impact of the EMC on the Quonset Hut. A weak visual contrast rating typically is assigned when a project is visible but will not distract from or dominate the setting.

7 DETERMINATION OF EFFECT

The VIA presented the results herein from a determination that the EMC project could affect historic properties eligible for inclusion in the National Register and in the MAPR. Of particular concern is the TA-22 Quonset Hut. GIS viewshed analyses indicate that the EMC project area will be visible from the Quonset Hut despite terrain and vegetation cover. The construction will not impact the Concrete Bowl (TA-06-0037) visually due to vegetation cover; however, if the tall ponderosa pine stands should recede or completely vanish, then the EMC will affect the viewshed of the Concrete Bowl.

We conducted a careful analysis of the area of potential effect (APE) and historical significance to determine if the proposed undertaking will adversely affect Manhattan Project–era historic properties. In determining the APE, we identified historic properties and considered visual contrast and simulations. The identification of historic properties allowed for further examination of significance. An in-depth look at the period of significance, character-defining features, integrity, and National Register eligibility produced background evidence for analyzing effect on the properties.

Based on an analysis of the APE and historical significance, we have achieved a determination of No Adverse Effect. Although the viewshed of the Quonset Hut will be affected, the effect will not be adverse

primarily due to the integrity of setting. This reasoning also pertains to the viewshed of the Concrete Bowl. No adverse effect would occur to the Concrete Bowl even if the vegetation currently shielding the structure no longer presented a viable screen for the EMC project area.

The significance and National Register eligibility of both buildings lie with their architectural character and association with the development of atomic weaponry during WWII. Regarding negative visual impacts from new construction, retention of setting plays an important role in the maintained integrity of both buildings. The industrial utility of the built environment, along with a natural landscape that conveys remoteness and security still present today around the Concrete Bowl and the Quonset Hut, provide for a setting that upholds historical significance and National Register eligibility.

During the height of the period of significance, landscape characteristics around both buildings provided a sense of industry distributed across a natural landscape (Figure 13). The built environment during 1944–1946 was one of testing, engineering, and production. The industry was atomic weaponry—an industry that survives to this day in the same location and in the same setting as originally regarded.



Figure 13. A 1946 aerial photograph shows the setting during the period of significance for the Concrete Bowl and the Quonset Hut. The Concrete Bowl can be seen in the upper left corner; the Quonset Hut appears on the right.

The EMC will be visible from the Quonset Hut and affect the viewshed of this important Manhattan Project-era building. Additionally, the new construction may be visible in the future from the Concrete Bowl if the current vegetation is thinned or disappears entirely. Yet, the affects to the viewsheds of both properties are negligible to the significance of the properties and not adverse.

Although of modern design, the EMC, while of a modern design, fits with the industrial character of the setting and functions much the same way as buildings from the period of significance. Weapons development, secrecy, and security are paramount to the sustained feel of the historical and modern setting. The EMC will not detract from that feel. Integrity important to the significance and eligibility of the Quonset Hut and the Concrete Bowl will not be negatively impacted due to the continuity that the EMC will maintain with the historic events of Project Y and the development of atomic weaponry.

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